

G Goodness-of-Fit Test

Verified Python analysis transcript

Test: G Goodness-of-Fit Test

Design: Likelihood-ratio goodness-of-fit analysis for one four-category reason variable.

Variables: reason

Null hypothesis: The four reason probabilities are equal.

Primary formula: $G^2 = 2 \sum_j O_j \ln(O_j/E_j)$

Valid source rows: 649

Verified results:

statistic: 142.60673176923228

p_value: 1.0360142426607893e-30

degrees_of_freedom: 3

maximum_absolute_signed_root: 17.919541569753875

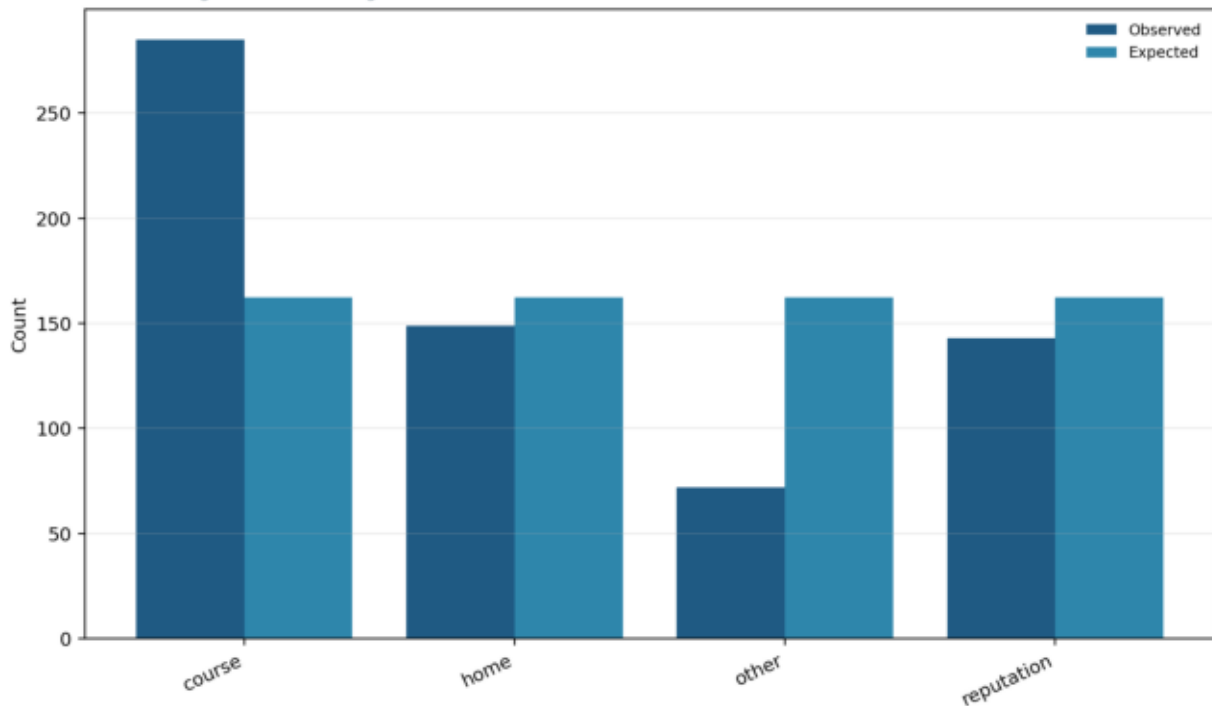
Interpretation:

The goodness-of-fit statistic is 142.606732 on 3 degrees of freedom ($p = 1.03601e-30$).

Category-level signed contributions identify whether each observed count is above or below its equal-share expectation.

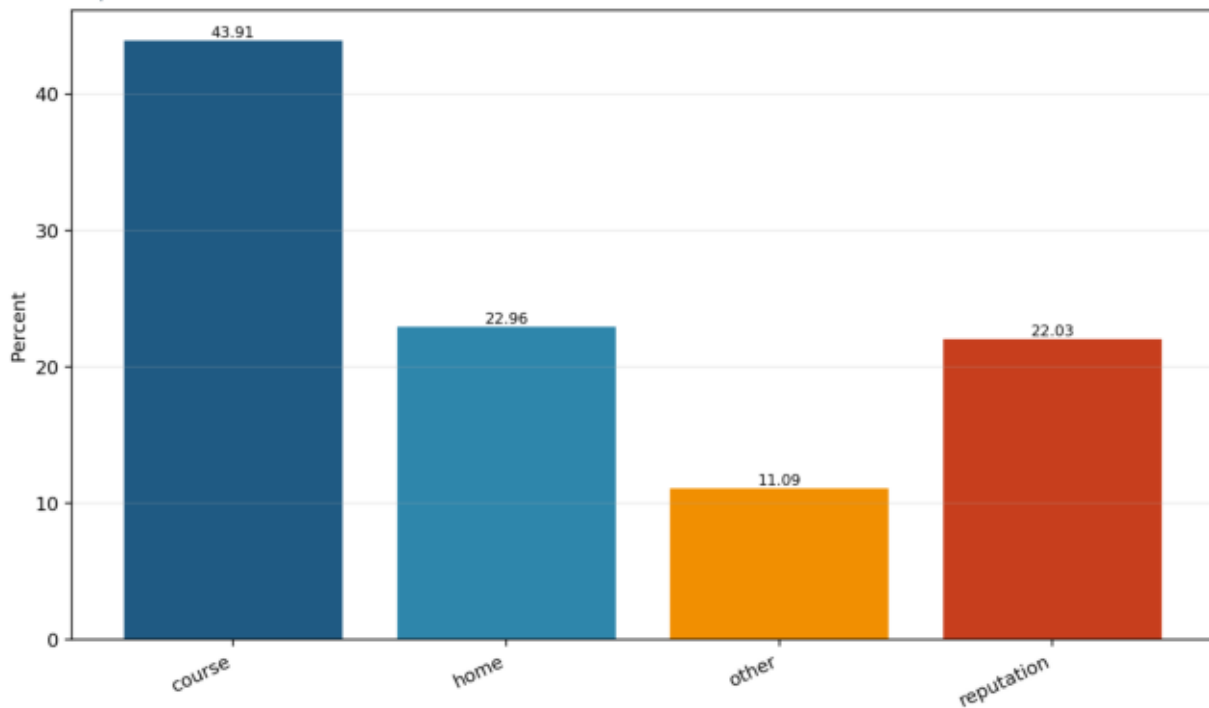
Observed and null-expected category counts

One-variable goodness-of-fit design



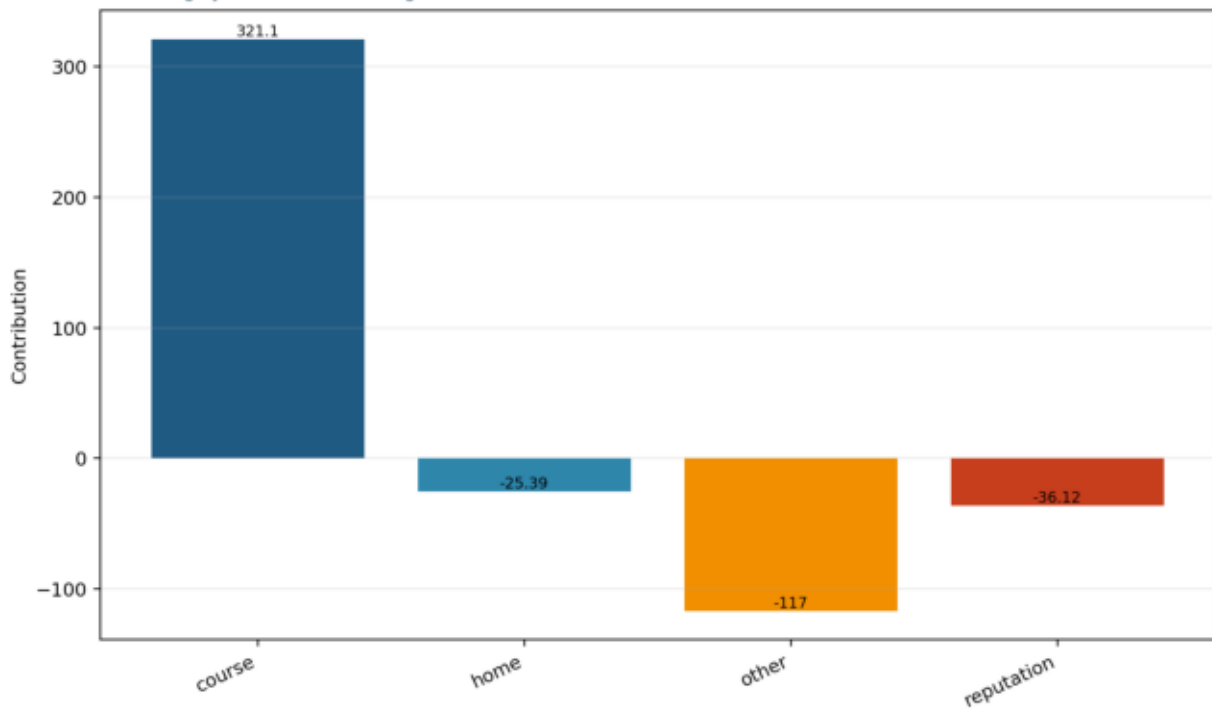
Observed category proportions

Empirical distribution



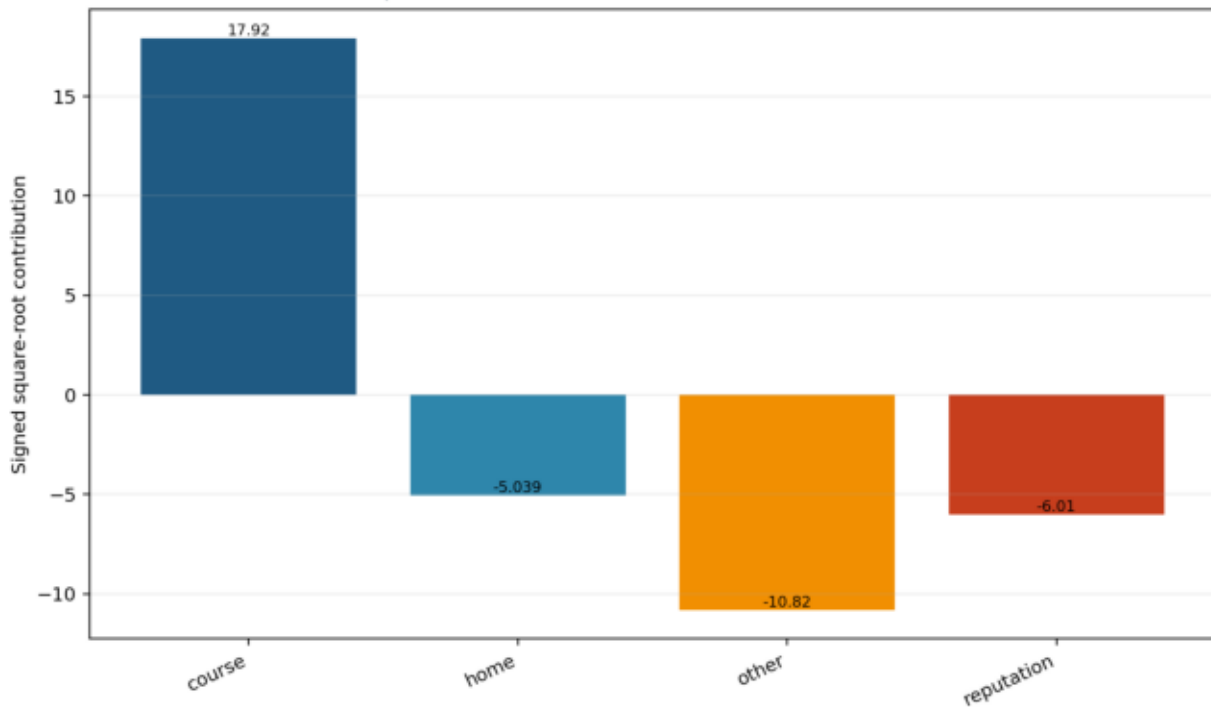
Likelihood-ratio contributions

Each category's contribution to the global statistic



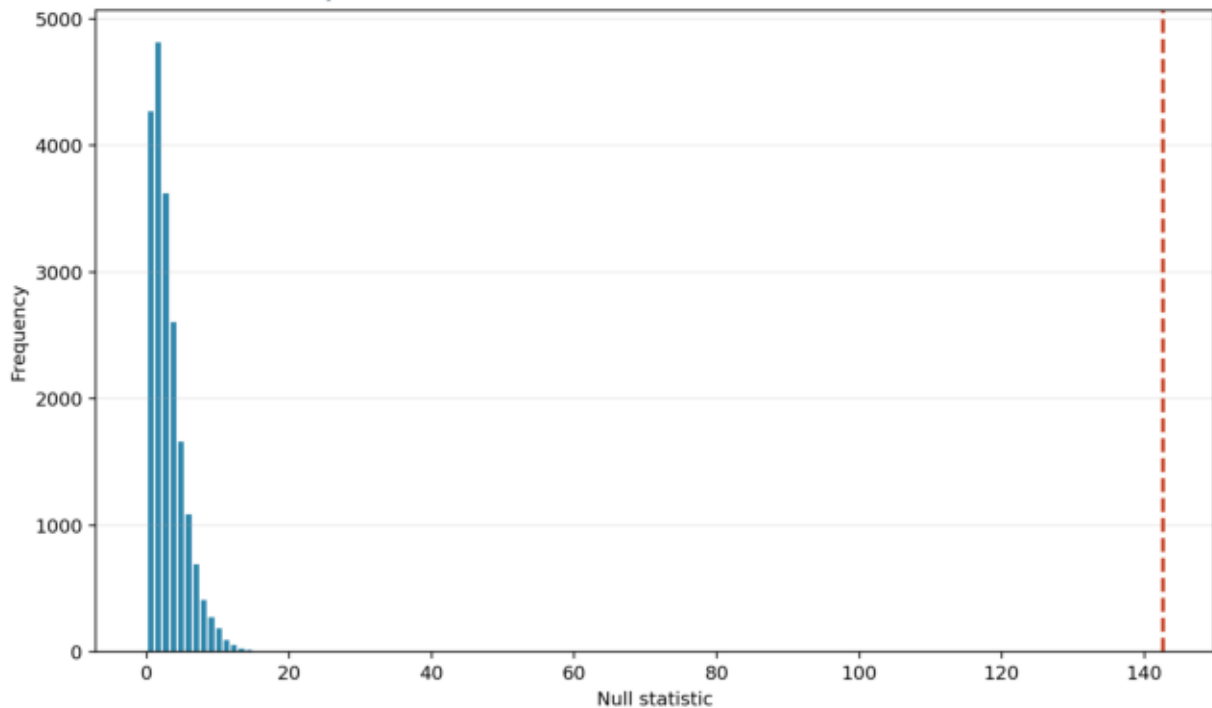
Signed contribution direction

Positive means observed above expected



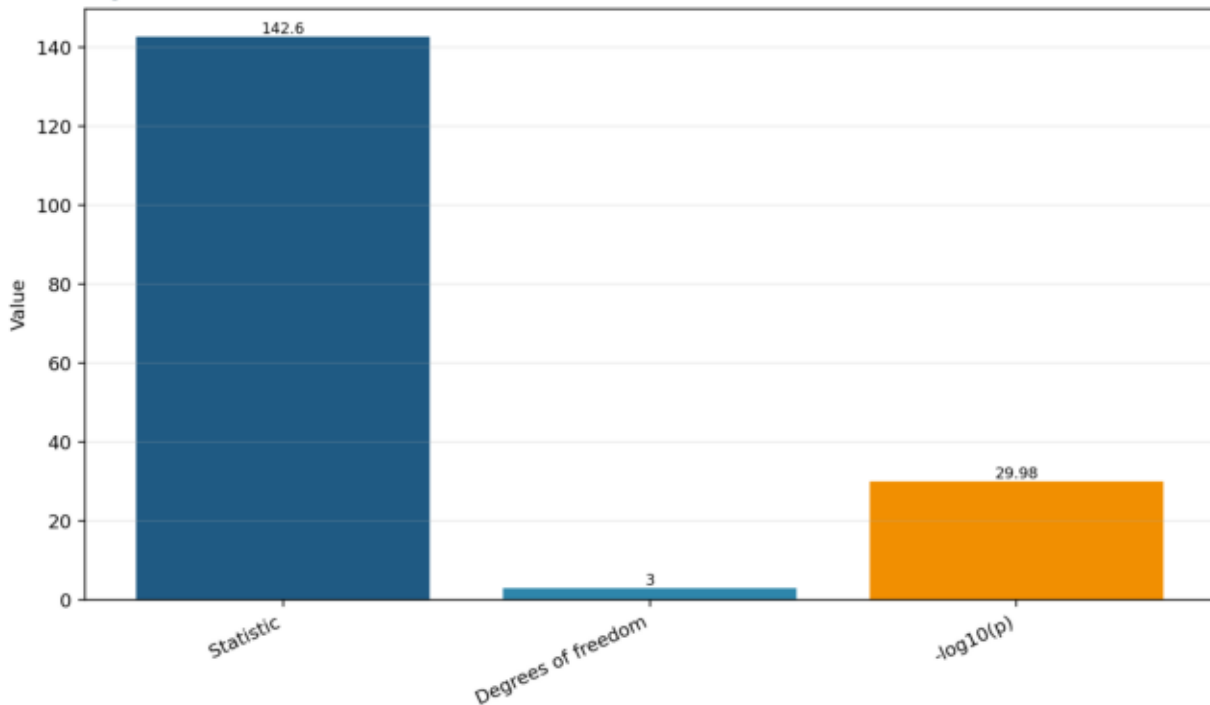
Asymptotic chi-square reference distribution

Observed statistic shown by the red line



Goodness-of-fit result summary

Magnitude and evidence



Observed Expected

Observed	Expected	Contribution	Signed_root
285	162.25	321.11	17.9195
149	162.25	-25.3872	-5.03857
72	162.25	-116.996	-10.8165
143	162.25	-36.12	-6.00999

Category Contributions

Contribution	Signed_root
321.11	17.9195
-25.3872	-5.03857
-116.996	-10.8165
-36.12	-6.00999